PSYCHOLOGICAL LITERATURE.

The Psychology of Reading. An Experimental Study of the Reading Pauses and Movements of the Eye. WALTER FENNO DEARBORN, Ph. D. Archives of Philosophy, Psychology, and Scientific Methods, No. 4, March, 1906. The Science Press, New York, 1906. pp. 132.

Dr. Dearborn's study marks a material advance upon the work done thus far upon the movements and pauses of the eye in reading. His primary object was "to determine with exactness the form and character of the movement of the eye in reading, and to define or plot the positions on the page which correspond to the so-called fixation or reading pauses of the eye."

A modification of the Dodge falling plate camera was used, giving "continuous photographs of the horizontal movements of the corneal reflection made upon a slowly falling photographic plate of great sensitiveness." The time of the movement is marked on the plate by the alternate admission and exclusion of light by a spring pendulum oscillating before the plate.

The place of the fixation pauses was determined, for the most part, by projecting the original photographic record upon a stereopticon screen, magnifying and adjusting this record to coincide with a drawing on the screen representing the length of the lines of print. A drawing of the record could then be made which could be placed "over the lines of the proper pages." The marking of the fixation pauses "is accurate to the limits of a single small letter of a newspaper page," save for certain important sources of error noted by the author as due to movements of the head and to the semi-nystagmatic movements of the eyes. Eight adults and three children were tested.

The rate of movement was found to vary considerably, but on the whole the measurements agree with those made by Dodge, and the rate is too fast for perception during the movement. However, some readers made certain slow shifting movements, sometimes ten to twenty times slower than the usual movement, accompanying the movements of the attention. These shiftings are classed as fixations, since they furnish data for perception.

It was found that the eye readily falls into a brief "motor habit" of making a certain fixed number or succession of pauses per line, for a given passage, and independently of the nature of the subject matter. Fast readers do this especially, and most readily in the shorter lines of uniform length. The first pause in each line is the longest one, the eye seeming to take a general summary at first, and there is a secondary long pause near the end of the line. At these pauses the attention is thought to expand and a more general perception is secured.

The exact point fixated may be in any part of the words, or in the spacing between them. It apparently "pays little attention to many of the laws of apperception or the rules of the rhetorician." These exact points of fixation are "significant only as representing the point about which are grouped the 'block' of letters that are simultaneously perceived as one word or phrase complex. It more often falls in the first third than at the centre of a given perception area."

More pauses are made with relative pronouns, prepositions, conjunctions, auxiliary verbs, and numerals, than with substantives, adjectives, etc. The pauses are longer and more numerous in reading slowly. Readers when asked to read as fast as possible saved nearly one-third of the time usually taken, and the number of pauses was reduced one-third. Eye fatigue was found to increase the number and duration of the fixation pauses.

Very great differences were found in the rate of reading when the subjects were given matter of special interest to each, and there was the same ranking in rate, with smaller differences, for *all* classes of reading matter. Rate differences between individuals and in the same individual are thought to depend largely, when other conditions are constant in "the ease with which a regular rhythmical movement can be established and sustained," consisting of a regular number of pauses per line and a fairly uniform arrangement in the order of long and short pauses. Lines of moderate and practically uniform length fulfil these conditions best.

Children were not found to have a different rate of eye movement from adults, but their fixation pauses are more frequent and generally longer, though quite short ones occur. Their "accuracy of fixation appears as exact as that of the adults."

Dr. Dearborn's study gives evidence of care and thoroughness on the main points studied, and presents a number of minor observations and interpretations which will be of value to those who study the subject further. EDMUND B. HUEY.

L'Attention spontanée dans la vie ordinaire, et ses applications pratiques, by ROERICH. Revue philosophique, No. 8, Août, 1906. Trente et unième année. pp. 136-156.

An element of volition characterizes all attention, yet spontaneous and voluntary attention are to be definitely distinguished. Spontaneous attention is discussed under two aspects,—primitive and apperceptive.

Primitive attention marks essentially the capacity of the child, or of the uncultivated man, yet it is a most important factor in the life of the scholar, or the artist. It is restricted to the interpretations of such particulars of the external world as are accessible to the senses, and is absolutely necessary in putting the mind in possession of elementary facts preparatory to classification and generalization. Molière, Rousseau and Zola excelled in this power, while in Voltaire and Racine it was markedly lacking.

The laws of primitive attention are as follows:

1. According as the individual is more or less attentive, the time of reaction after perception is shortened or lengthened.
2. However vivid the stimulus, primitive attention cannot fix an object for more than a few seconds at a time.
3. In every change from one perception to another, time must be allowed for the exercise of judgment upon this change.

The psycho-pedagogical rules based upon these laws are:

1. To hold the attention, impressions must move progressively in intensity or vividness. (This progression soon reaches a maximum.)
2. After each impression, a delay for recovery (neither too long, nor too short) must be allowed.
3. To waken primitive attention, the presentation must be nicely determined.
4. Impressions of a different nature, when they relate to the same object, may be allowed.
5. Primitive attention is the most certainly aroused by contrast among successive or simultaneous impressions.